

DETAILED ACTION

Continued Examination Under 37 CFR 1.114

1. A request for continued examination under 37 CFR 1.114, including the fee set forth in 37 CFR 1.17(e), was filed in this application after final rejection. Since this application is eligible for continued examination under 37 CFR 1.114, and the fee set forth in 37 CFR 1.17(e) has been timely paid, the finality of the previous Office action has been withdrawn pursuant to 37 CFR 1.114. Applicant's submission filed on 10/05/2009 has been entered.

Status of Claims

2. Claims 33-37, 41-44, 49, 65 and 66 remain pending in the application.

Claim Rejections - 35 USC § 102

3. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

4. Claims 33, 35 and 65 are rejected under 35 U.S.C. 102(b) as being anticipated by Shibo et al. (US Patent No. 6123247).

Regarding claim 65, Shibo et al. teaches a method for populating and soldering a circuit board (32, figure 6) having a first side and a second side and at least one

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wired, electrical component ("THT-component") having at least one connection wire or connection pin and a housing or casing thermally critical for conventional (see, the component 57, figure 6), automatic soldering technology, comprising the steps of: populating on the first side of the circuit board with the at least the THT-component with the connection wire or pin stuck from the first side through a hole and emerging on the second side of the circuit board in the area of a soldering contact surface printed with a solder paste(see all the wire components which are non heat resistant are placed on the first or the upper side of the PCB, see figure 6 and column 3, line 62-column 4, line 40); placing the circuit board so populated into a reflow oven for the soldering (see, abstract, column 1, lines 35-46, and column 3, lines 62-67); and at least partially shielding the first side populated with the THT-component, by the circuit board itself, from a heat or energy feed effecting the soldering in the reflow oven, from the heat or energy feed acting on the second side for the soldering, wherein in an essentially horizontal arrangement of the circuit board during travel through the reflow oven for soldering the THT-components are located underneath the circuit board(Note the hot air or the heat feed 101 as in figure 6, acts on the second side of the PCB 32 on which the heat resistance component 37 is placed). Shibo et al. also teaches a circuit board arranged horizontally during travel through the reflow oven by a conveyor (81, figures 1A and 5, and column 2, lines 43-60) for the soldering; wherein THT-components are located on a side of the circuit board opposite that of the heat resistant components (Note, the limitation calling for THT-component to be located underneath the circuit board is noted, however one of ordinary skill in the art reading the claims in light of the

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applicant's disclosure, would appreciate that said limitation "underneath" can be interpreted to mean, that side of the circuit board opposite the direction of the heat feed). Shibo et al. teaches THT component(s) of low heat resistant located at a side of the circuit board opposite the direction of the heat feed or the hot side (101) thereby enabling said components to be thermally shielded or separated from the direct heat by the circuit board itself (also see, column 4, lines 33-40 and figure 6). (It should be pointed out that though in figure 6, cool air (102) is used for cooling and regulating the temperature on the side of the non-heat resistant components, regardless said components are thermally separated by the circuit board itself and therefore the circuit board of Shibo et al. inherently meet the shielding limitation (see, column 3, line 62-column 4, line 50).

Regarding claim 33, Shibo et al. teaches comprising the step of: applying solder paste to solder contact (see, column 4, lines 33-40 and column 5, lines 11-25) surfaces provided on the second side of the circuit board for a populating of the second side of the circuit board with at least one SMD-component, wherein: following populating of the second side of the circuit board with the SMD-component, it is soldered, together with the connection wire of the THT-component, in the reflow oven (Note Shibo et al. teaches a one step process by which both the heat resistance and the non-heat resistant components are solder in one pass reflow, column 5, line 53 – column 6, line 10 and column 7, lines 34-61).

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Regarding claim 35, Shibo et al. teaches having at least one SMD-component populated at the first side of the circuit board (see, the heat resistant surface mount component (SMD) 37, figure 6).

Claim Rejections - 35 USC § 102/103

4. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

5. Claims 34, 36 and 66 are rejected under 35 U.S.C. 102(b) as being anticipated by, or in the alternative under or 35 U.S.C. 103(a) as being obvious over Shibo et al. (US Patent No. 6123247)

Regarding claim 66, Shibo et al. teaches a method for populating and soldering a circuit board (32, figure 6) having a first side and a second side and at least one wired, electrical component ("THT-component") having at least one connection wire or connection pin and a housing or casing thermally critical for conventional (see, the component 57, figure 6), automatic soldering technology, comprising the steps of: populating on the first side of the circuit board with the at least the THT-component with

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the connection wire or pin stuck from the first side through a hole and emerging on the second side of the circuit board in the area of a soldering contact surface printed with a solder paste (see all the wire components which are non heat resistant are placed on the first or the upper side of the PCB, see figure 6 and column 3, line 62-column 4, line 40); placing the circuit board so populated into a reflow oven for the soldering (see, abstract, column 1, lines 35-46, and column 3, lines 62-67); thermally separating the first side populated with the THT-component by the circuit board itself, from the heat or energy feed acting on the second side for the soldering (Note the hot air or the heat feed 101 as in figure 6, acts on the second side of the PCB 32 on which the heat resistance component 37 is placed). Shibo et al. also teaches a circuit board arranged horizontally during travel through the reflow oven by a conveyor (81, figures 1A and 5, and column 2, lines 43-60) for the soldering; wherein THT-components are located on a side of the circuit board opposite that of the heat resistant components (Note, the limitation calling for THT-component to be located underneath the circuit board is noted, however one of ordinary skill in the art reading the claims in light of the applicant's disclosure, would appreciate that said limitation "underneath" can be interpreted to mean, that side of the circuit board opposite the direction of the heat feed) . Shibo et al. teaches THT component(s) of low heat resistant located at a side of the circuit board opposite the direction of the heat feed or the hot side (101) thereby enabling said components to be thermally shielded or separated from the direct heat by the circuit board itself (also see, column 4, lines 33-40 and figure 6). (It should be pointed out that though in figure 6, cool air (102) is used for cooling and regulating the

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temperature on the side of the non-heat resistant components, regardless said components are thermally separated by the circuit board itself and therefore the circuit board of Shibo et al. inherently meet the shielding limitation (see, column 3, line 62-column 4, line 50).

Shibo et al. fails to teach the specific minimum temperature difference between the first side and the second side as set forth in this claim. However Shibo et al. teaches directing hot air at a temperature of about 420-450 degrees Celsius to the first side (hot side having the heat resistant components) and directing cold air at about 90 degrees Celsius to regulate the temperature of the second side (cold side, having the non-heat resistant component) therefore by invoking on basic concept of heat transfer and heat balance one of ordinary skill would appreciate that the heat differential between the first side and the second side would at least exceed 28 degrees Celsius.

Regarding claim 34, Shibo et al. teaches comprising the step of: applying solder paste to solder contact (see, column 4, lines 33-40 and column 5, lines 11-25) surfaces provided on the second side of the circuit board for a populating of the second side of the circuit board with at least one SMD-component, wherein: following populating of the second side of the circuit board with the SMD-component, it is soldered, together with the connection wire of the THT-component, in the reflow oven (Note Shibo et al. teaches a one step process by which both the heat resistance and the non-heat resistant components are soldered in one pass reflow, column 5, line 53 – column 6, line 10 and column 7, lines 34-61).

Regarding claim 36, Shibo et al. teaches having at least one SMD-component populated at the first side of the circuit board (see, the heat resistant surface mount component (SMD) 37, figure 6).

Claim Rejections - 35 USC § 103

6. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

7. Claims 37, and 41-43 are rejected under 35 U.S.C. 103(a) as being unpatentable over Shibo et al. (US Patent No. 6123247) as applied to claim 65 above and further in view of Wentworth (US Patent No. 5373984).

Regarding claim 37, Shibo et al. teaches a single pass solder reflow process of mixed technology wiring boards containing both surface mount components (SMD) of high heat resistance and plated through-hole components (THT) of low heat resistance, but fails to teach the two pass reflow process as set forth in claim 37.

Wentworth teaches a two pass solder reflow process of mixed technology wiring boards containing both surface mount components (SMD) and plated through-hole components (THT), (see Wentworth, abstract); wherein a conductive adhesive (note the conductive adhesive includes solder paste, (see, column 6, lines 34-38)) is applied to a first side of the circuit board and populated with SMD; applying conductive adhesive to a location of said first side and populating with plated through-hole components

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(THT), soldering by reflowing to adhere the plurality of surface mount components on the first side of the circuit board (see Wentworth , column 2, lines 44-58), continuing a second pass by applying conductive adhesive to a second side of the circuit board and populated with SMD; applying adhesive to a location of said second side and populating with plated through-hole components (THT), soldering by reflowing to adhere the plurality of surface mount components on said second side of the circuit board (see, Wentworth, column 2, line 58-column 3, line 14). Reading Wentworth, one would appreciate that surface mount components and plated through-hole components of the same thermal or heat tolerance can be mixed populated on common side of a double sided circuit board and reflow at the same time.

It would have been obvious to one of ordinary skill in the art at the time of the invention to modify the process of, Shibo et al. to use a sequential or two pass reflow process as taught by Wentworth which would have meant substituting one known reflow alternative for another which allows mixed surface mount components and plated through-hole components of the same thermal or heat tolerance to be mixed populated on the same side of a double sided circuit board and reflow at the same time (see Wentworth , column 2, line 44- column 3, line 14).

Regarding claim 41, Shibo et al. is silent on adhesive, however, Wentworth recite conductive adhesive for securing both the SMD and the THT-component; wherein said conductive adhesive encompasses solder paste (see, column 6, lines 34-38). The selection of an appropriate conductive adhesive to secure THT-component would have

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been within purview of one of ordinary skill in the art since said adhesive is not limited to solder.

Regarding claim 42 and 43, both Shibo et al. and Wentworth teach securing the THT-component in the through-hole of the circuit board, but are silent on the mechanical snap-in mechanism as set forth in claims 42 and 43. However said mechanical snap-in mechanism is known as convention in the art for securing THT-component onto a circuit board (Furthermore support for said assertion can also be found in the applicant's specification, last paragraph of page 11). Selection of said mechanical snap-in mechanism to secure the THT-component onto the circuit board would have been within purview of one of ordinary skill in the art.

8. Claim 44 is rejected under 35 U.S.C. 103(a) as being unpatentable over Shibo et al. (US Patent No. 6123247) as applied to claim 65 above and further in view of Wentworth (US Patent No. 5373984).

Regarding claim 44, Shibo et al. teaches a single pass solder reflow process of mixed technology wiring boards containing both surface mount components (SMD) and plated through-hole components (THT), but fails to teach the two pass reflow process as set forth in claim 44.

Wentworth teaches a two pass solder reflow process of mixed technology wiring boards containing both surface mount components (SMD) and plated through-hole components (THT), (see Wentworth, abstract); wherein a conductive adhesive (note the conductive adhesive includes solder paste, (see, column 6, lines 34-38)) is applied

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to a first side of the circuit board and populated with SMD; applying conductive adhesive to a location of said first side and populating with plated through-hole components (THT), soldering by reflowing to adhere the plurality of surface mount components on the first side of the circuit board (see Wentworth , column 2, lines 44-58), continuing a second pass by applying conductive adhesive to a second side of the circuit board and populated with SMD; applying adhesive to a location of said second side and populating with plated through-hole components (THT), soldering by reflowing to adhere the plurality of surface mount components on said second side of the circuit board (see, Wentworth, column 2, line 58-column 3, line 14). Reading Wentworth, one would appreciate that surface mount components and plated through-hole components of the same thermal or heat tolerance can be mixed populated on common side of a double sided circuit board and reflow at the same time.

It would have been obvious to one of ordinary skill in the art at the time of the invention to modify the process of, Shibo et al. to use a sequential or two pass reflow process as taught by Wentworth which would have meant substituting one known reflow alternative for another which allows mixed surface mount components and plated through-hole components of the same thermal or heat tolerance to be mixed populated on the same side of a double sided circuit board and reflow at the same time (see Wentworth , column 2, line 44- column 3, line 14).

Response to Arguments

9. Applicant's arguments filed 10/05/2009 have been fully considered but they are not persuasive.

Applicant argues that Shibo does not teach using the circuit board itself for shielding or thermally separating because it teaches exposing the components to cooling air while other components are masked from the cooling air by means of a mask pallet. Applicant argues that the present invention does not contemplate these additional features.

This argument is not commensurate with the scope of the claimed invention as the present claim language does not exclude these additional features. As shown in figure 6, the circuit board of Shibo is arranged such that it separates THT-components on the first side of the board from the heat or energy feed directed onto the second side of the circuit board. Therefore, it is taken that the "circuit board itself" serves as a heat shield (See, column 3, line 62-column 4, line 50).

Conclusion

10. Any inquiry concerning this communication or earlier communications from the examiner should be directed to MICHAEL ABOAGYE whose telephone number is (571)272-8165. The examiner can normally be reached on Mon - Fri 8:30am - 5pm.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Jessica Ward can be reached on 571-272-1223. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

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